Amendment and Response
Applicant: Curtis Gregory Kelsay
Serial No.: 09/491,994
Filed: Jan. 26, 2000
Docket No.: 10990356-2
Title: AN OPTICAL INTERLINK BETWEEN AN OPTICAL TRANSDUCER AND OPTICAL DATA PORT

REMARKS

The following remarks are made in response to the Non-Final Office Action mailed November 6, 2002, in which claims 20-41 were rejected. With this Amendment, claims 24, 30-32, and 40 have been cancelled without prejudice and claims 20, 28, 29, 33, and 41 have been amended to clarify Applicant's invention. Claims 20-23, 25-29, 33-39, and 41, therefore, remain pending in the application and are presented for reconsideration and allowance.

Claim Objections

Claims 20-27 are objected to because of informalities. More specifically, claim 20 has been objected to because the "transducer" and "data port" are inferentially recited and use of the language "adapted to" does not positively recite these limitations.

With respect to claim 20, Applicant's intent is to claim the subcombination of a transmit light pipe and a receive light pipe rather than the combination of an optical transducer, an optical data port, a transmit light pipe, and a receive light pipe. As such, Applicant has avoided positive recitation of the optical transducer and the optical data port by use of the language "adapted to". Thus, Applicant submits that the scope of the claim is reasonably clear. Applicant, therefore, respectfully requests that the objection to claims 20-27 be reconsidered and withdrawn.

Claim Rejections under 35 U.S.C. § 103

Claims 20, 21, 25, 28, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Tsuji U.S. Patent No. 5,796,890 in view of the Pressler U.S. Patent No. 6,005,700. Claims 26, 27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Tsuji patent in view of the Pressler patent, as applied to claims 20, 21, 25, 28, 30, and 31, and further in view of the Sedlmayr U.S. Patent No. 6,034,818. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Tsuji patent in view of the Pressler patent, as applied to claims 20, 21, 25, 28, 30, and 31, and further in view of the Kawakami et al. U.S. Patent No. 5,848,203. Claims 22-24 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Tsuji patent in view of the Pressler patent, as

applied to claims 20, 21, 25, 28, 30, and 31, and further in view of the Sedlmayr patent and the Kawakami et al. patent.

With respect to the rejection of independent claims 20 and 28, with this Amendment, independent claim 20 has been amended to clarify that the transmit light pipe is adapted to exit and diverge light from the optical data port and the receive light pipe is adapted to converge light on the optical transducer, and independent claim 28 has been amended to clarify that optically coupling the optical transducer with the optical data port includes transmitting light rays from the optical transducer, culminating the transmitted light rays, optically transmitting the transmitted light rays, and distributing the transmitted light rays from the transmit light pipe, including exiting and increasing an illumination angle of the transmitted light rays from the optical data port.

With respect to the rejection of independent claims 34 and 41, Applicant respectfully traverses this rejection. The optical interlink of independent claim 34 includes a transmit lens adapted to increase an angle of illumination of light exiting the optical data port and the method of optically coupling the optical transducer with the optical data port of independent claim 41 includes distributing the transmitted light rays from the transmit light pipe and exiting and diverging the transmitted light rays from the optical data port.

The Examiner contends that the Tsuji patent teaches a device adapted to optically exchange information between an optical transducer adapted to transmit and receive information optically and an optical data port. More specifically, the Examiner contends that elements 20 and 21 of the Tsuji patent constitute an optical transducer and that element 10 of the Tsuji patent constitutes an optical data port. The Examiner recognizes, however, that the Tsuji patent does not teach a transmit light pipe and a receive light pipe. As such, the Examiner contends that the Pressler patent teaches that light pipes and fiber optic cables are interchangeable light transfer mediums and suggest that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fiber optic cables of the Tsuji patent to be light pipes in view of the Pressler patent. In addition, the Examiner recognizes that the Tsuji patent in view of the Pressler patent does not teach increasing an angle of light exiting the optical data port. As such, the Examiner contends that the Kawakami et al. patent teaches a lens for increasing an angle of transmitted light and suggests that it would have been obvious to one having ordinary skill in the art at the time the

invention was made to modify the Tsuji patent in view of the Pressler patent to have a lens as taught by the Kawakami et al. patent.

Applicant submits that modifying the Tsuji patent in view of the Pressler patent and further in view of the Kawakami et al. patent, in the manner suggested by the Examiner, would not result in the present invention. For example, the Tsuji patent discloses a control station 10 and a field station 20 connected by optical fibers 41a and 41b (Fig. 1; col. 8, lines 28-41). Light which passes through optical fiber 41a is reflected by optical light splitter-coupler 133 to a light receiver 132 (Fig. 1; col. 8, lines 52-56). Light which passes through optical fiber 41a from field station 20 to control station 10, however, does not exit from control station 10. Optical fiber 41a and control station 10 of the Tsuji patent, therefore, do not constitute a transmit light pipe nor an optical data port, respectively, since light which passes through optical fiber 41a is not exited or diverged from control station 10. Rather, light which passes through optical fiber 41a is reflected to light receiver 132 within control station 10. Thus, Applicant submits that the combination of the Tsuji, Pressler, and Kawakami et al. patents does not teach or suggest a transmit light pipe which exits and diverges light from an optical data port, as claimed in independent claims 20, 28, 34, and 41.

In addition, Applicant submits that modifying the Tsuji patent in view of the Pressler patent and further in view of the Kawakami et al. patent, in the manner suggested by the Examiner, would render the system of the Tsuji patent inoperative and would not result in the present invention. For example, the Kawakami et al. patent teaches a lens 27A opposed to an end face of a light-emitting side optical fiber 26A such that light beams which pass through lens 27A have a large angle so that they are not coupled with the light-emitting side optical fiber 26A (Fig. 6; col. 2, lines 39-42). Thus, providing the Tsuji patent in view of the Pressler patent with a lens as taught by the Kawakami et al. patent would result in light which passes from field station 20 to control station 10 through optical fiber 41a being directed so as not to be coupled with optical light splitter-coupler 133. Accordingly, the system of the Tsuji patent would be rendered inoperative.

Accordingly, modifying the Tsuji patent in view of the Pressler patent and further in view of the Kawakami et al. patent, in the manner suggested by the Examiner would not overcome the shortcomings of the Tsuji patent and, therefore, would not result in the present

invention. Applicant, therefore, submits that the combination of the Tsuji, Pressler, Kawakami et al., and Sedlmayr patents does not teach or suggest the present invention.

In view of the above, Applicant submits that independent claims 20, 28, 34, and 41 are patentably distinct from the Tsuji, Pressler, Kawakami et al., and Sedlmayr patents and, therefore, in a condition for allowance. Furthermore, as dependent claims 21-23 and 25-27 further define patentably distinct claim 20, dependent claims 29 and 33 further define patentably distinct claim 28, and dependent claims 35-39 further define patentably distinct claim 34, Applicant submits that dependent claims 21-23 and 25-27, 29 and 33, and 35-39 are also in condition for allowance. Applicant, therefore, respectfully requests that the rejection of claims 20-41 under 35 U.S.C. 103(a) be reconsidered and withdrawn and that claims 20-23, 25-29, 33-39, and 41 be allowed.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 20-23, 25-29, 33-39, and 41 are all in condition for allowance and requests reconsideration of the application and allowance of all pending claims.

Attached hereto is a marked-up version of the changes made to the specification and/or the claims by the current Amendment. The attached pages are captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"**.

Any inquiry regarding this Amendment and Response should be directed to Gregg W. Wisdom at Telephone No. (360) 212-8052, Facsimile No. (360) 212-3060. In addition, all correspondence should continue to be directed to the following address:

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Amendment and Response
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Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this paper or papers, as described herein, are being facsimile transmitted to the United States Patent and Trademark Office, Fax No. (703) 872-9318, on this 29th day of January, 2003.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Curtis Gregory Kelsay	Examiner:	Kevin D. Williams
Serial No.:	09/491,994	Group Art Unit:	2854
Filed:	Jan. 26, 2000	Docket No.:	10990356-2
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AMENDMENT AND RESPONSE

Commissioner for Patents
Washington, D.C. 20231

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Dear Sir/Madam:

This Amendment and Response is in reply to the Non-Final Office Action mailed November 6, 2002. Please amend the above-identified patent application as follows:

IN THE CLAIMS

Please cancel claims 24, 30-32, and 40 without prejudice.

Please amend claims 20, 28, 29, 33, and 41 as follows:

1-19 (Previously Cancelled).

20. (Amended) A light pipe assembly adapted to optically exchange information between an optical transducer adapted to transmit and receive information optically and an optical data port, the light pipe assembly comprising:

a transmit light pipe adapted to optically transmit information optically transmitted by the optical transducer from the optical transducer to the optical data port; and

a receive light pipe adapted to optically receive information via the optical data port and optically transmit the received information to the optical transducer,

wherein the transmit light pipe is adapted to exit and diverge light from the optical data port, and wherein the receive light pipe is adapted to converge light on the optical transducer.

21. The light pipe assembly of claim 20, wherein a first end of the transmit light pipe is adapted to be optically coupled to the optical transducer and a second end of the transmit light pipe is adapted to provide a portion of the optical data port.

22. The light pipe assembly of claim 21, further comprising:

a first lens provided between the first end of the transmit light pipe and the optical transducer, wherein the first lens is adapted to optically couple the optical transducer to the transmit light pipe and collimate light received from the optical transducer into the first end of the transmit light pipe; and

a second lens provided at the second end of the transmit light pipe, wherein the second lens is adapted to increase an angle of light exiting the optical data port.

23. The light pipe assembly of claim 22, wherein the first lens and the second lens of the transmit light pipe are formed as part of the transmit light pipe.

24. (Cancelled) ~~The light pipe assembly of claim 22, wherein the angle of light exiting the optical data port is adapted to diverge from the optical data port.~~

25. The light pipe assembly of claim 20, wherein a first end of the receive light pipe is adapted to be optically coupled to the optical transducer and a second end of the receive light pipe is adapted to provide a portion of the optical data port.

26. The light pipe assembly of claim 25, further comprising:

a first lens provided between the first end of the receive light pipe and the optical transducer, wherein the first lens is adapted to optically couple the receive light pipe to the optical transducer; and

a second lens provided at the second end of the receive light pipe, wherein the second lens is adapted to collimate light received at the optical data port into the second end of the receive light pipe.

27. The light pipe assembly of claim 26, wherein the first lens and the second lens of the receive light pipe are formed as part of the receive light pipe.

28. (Amended) A method of optically coupling an optical transducer adapted to transmit and receive information optically with an optical data port, the method comprising ~~the steps of~~:

receiving light rays at the optical data port;

collimating the received light rays into a first end of a receive light pipe;

optically transmitting the received light rays within the receive light pipe ~~from the first end of the receive light pipe~~ to a second end of the receive light pipe;

optically transmitting the received light rays to the optical transducer from the second end of the receive light pipe; ~~and~~

receiving the received light rays at the optical transducer;

transmitting light rays from the optical transducer;

collimating the transmitted light rays into a first end of a transmit light pipe;

optically transmitting the transmitted light rays within the transmit light pipe to a second end of the transmit light pipe; and

distributing the transmitted light rays from the second end of the transmit light pipe, including exiting and increasing an illumination angle of the transmitted light rays from the optical data port.

29. (Amended) The method of claim 28, wherein ~~the step of~~ collimating the received light rays includes passing the received light rays through a lens at the first end of the receive light pipe.

30. (Cancelled) ~~The method of claim 28, further comprising the steps of:~~

~~transmitting light rays from the optical transducer;~~

~~collimating the transmitted light rays into a first end of a transmit light pipe;~~

~~optically transmitting the transmitted light rays within the transmit light pipe from the first end of the transmit light pipe to a second end of the transmit light pipe; and~~

~~distributing the transmitted light rays from the second end of the transmit light pipe.~~

31. (Cancelled) ~~The method of claim 30, wherein the step of distributing the transmitted light rays includes exiting the transmitted light rays from the optical data port.~~

32. (Cancelled) ~~The method of claim 31, wherein exiting the transmitted light rays from the optical data port includes increasing an illumination angle of the transmitted light rays exiting from the optical data port.~~

33. (Amended) The method of claim ~~32~~28, wherein increasing the illumination angle of the transmitted light rays includes passing the transmitted light rays through a lens at the second end of the transmit light pipe and diverging the transmitted light rays exiting from the optical data port.

34. An optical interlink, comprising:

an optical transducer adapted to transmit and receive information optically;

a light pipe having a first end optically coupled to the optical transducer and a second end arranged to provide an optical data port;

a transmit lens adapted to increase an angle of illumination of light exiting the optical data port; and

a receive lens adapted to collimate light into the light pipe.

35. The optical interlink of claim 34, wherein the light pipe provides bi-directional communication between the optical transducer and the optical data port.

36. The optical interlink of claim 34, wherein the optical transducer includes an infra-red transducer.

37. The optical interlink of claim 34, wherein the optical transducer includes a receive portion and a transmit portion, and wherein the light pipe includes a receive light pipe optically coupled to the receive portion of the optical transducer and a transmit light pipe optically coupled to the transmit portion of the optical transducer.

38. The optical interlink of claim 37, wherein the transmit lens is adapted to increase the angle of illumination of light from the transmit light pipe and the receive lens is adapted to collimate light into the receive light pipe.

39. The optical interlink of claim 34, wherein the optical interlink is configured to optically exchange information for a printer, wherein the optical transducer and the light pipe are disposed within the printer and wherein the light pipe is adapted to optically exchange information with the optical transducer and externally of the printer.

40. (Cancelled) ~~The light pipe assembly of claim 20, wherein the transmit light pipe is adapted to diverge light from the optical data port, and wherein the receive light pipe is adapted to converge light on the optical transducer.~~

41. (Amended) A method of optically coupling an optical transducer adapted to transmit and receive information optically with an optical data port, the method comprising ~~the steps of~~:

receiving light rays at the optical data port;

collimating the received light rays into a receive light pipe;

optically transmitting the received light rays within the receive light pipe;

optically transmitting the received light rays to the optical transducer from the receive light pipe, including converging the received light rays on the optical transducer;

transmitting light rays from the optical transducer;

collimating the transmitted light rays into a transmit light pipe;

optically transmitting the transmitted light rays within the transmit light pipe; and

distributing the transmitted light rays from the transmit light pipe, including exiting and diverging the transmitted light rays from the optical data port.